## SPEC® CFP2006 Result

**Huawei**

Huawei RH2288H V3 (Intel Xeon E5-2620 v4)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>= 99.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>= 94.3</td>
</tr>
</tbody>
</table>

### Software

- **Operating System:** SUSE Linux Enterprise Server 12 SP1 3.12.49-11-default
- **Compiler:** C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
- **Auto Parallel:** Yes
- **File System:** ext4
- **System State:** Run level 3 (multi-user)

### Hardware

- **CPU Name:** Intel Xeon E5-2620 v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz
- **CPU MHz:** 2100
- **FPU:** Integrated
- **CPU(s) enabled:** 16 cores, 2 chips, 8 cores/chip
- **CPU(s) orderable:** 1,2 chip
- **Primary Cache:** 32 KB I + 32 KB D on chip per core
- **Secondary Cache:** 256 KB I+D on chip per core

### Test Information

- **CPU2006 license:** 3175
- **Test sponsor:** Huawei
- **Test date:** Oct-2016
- **Hardware Availability:** Mar-2016
- **Tested by:** Huawei
- **Software Availability:** Mar-2016

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**SPECfp2006 = 99.4**

**SPECfp_base2006 = 94.3**

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### Benchmarks

<table>
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<tr>
<th>Benchmark</th>
<th>Score</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>40.2</td>
</tr>
<tr>
<td>416.gamess</td>
<td>33.7</td>
</tr>
<tr>
<td>433.milc</td>
<td>72.4</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>173</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>40.1</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>236</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>27.3</td>
</tr>
<tr>
<td>444.namd</td>
<td>60.0</td>
</tr>
<tr>
<td>447.dealII</td>
<td>43.9</td>
</tr>
<tr>
<td>450.soplex</td>
<td>60.3</td>
</tr>
<tr>
<td>453.povray</td>
<td>53.2</td>
</tr>
<tr>
<td>454.calculix</td>
<td>55.4</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>200</td>
</tr>
<tr>
<td>465.tonto</td>
<td>51.7</td>
</tr>
<tr>
<td>470.lbm</td>
<td>37.8</td>
</tr>
<tr>
<td>481.wrf</td>
<td>80.3</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>66.3</td>
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L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2133T-R)
Disk Subsystem: 1 x 480 GB SATA SSD
Other Hardware: None

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: none

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>410.bwaves</td>
<td>30.4</td>
<td>447</td>
</tr>
<tr>
<td>416.gamess</td>
<td>580</td>
<td>33.8</td>
</tr>
<tr>
<td>433.mile</td>
<td>127</td>
<td>72.4</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>52.6</td>
<td>173</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>174</td>
<td>41.0</td>
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<tr>
<td>436.cactusADM</td>
<td>20.6</td>
<td>579</td>
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<td>437.leslie3d</td>
<td>39.1</td>
<td>240</td>
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<td>444.namd</td>
<td>303</td>
<td>26.5</td>
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<td>447.dealII</td>
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<td>60.3</td>
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<tr>
<td>450.soplex</td>
<td>187</td>
<td>44.7</td>
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<tr>
<td>453.povray</td>
<td>100</td>
<td>53.1</td>
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<tr>
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<td>165</td>
<td>50.0</td>
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<td>261</td>
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<td>25.0</td>
<td>551</td>
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<td>139</td>
<td>80.3</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>299</td>
<td>65.2</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS configuration:
Set Power Efficiency Mode to Custom
Set Snoop Mode to HS mode
Set Patrol Scrub to Disable
Set Hyper-Threading to Disable
Sysinfo program /spec16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-1jfn Tue Oct 25 14:12:55 2016

This section contains SUT (System Under Test) info as seen by

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Platform Notes (Continued)

some common utilities. To remove or add to this section, see:
http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E5-2620 v4 @ 2.10GHz
2 "physical id"s (chips)
16 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
cache size : 20480 KB

From /proc/meminfo
MemTotal: 264064288 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 1
# This file is deprecated and will be removed in a future service pack or
release.
# Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP1"
VERSION_ID="12.1"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
Linux linux-1jfn 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714A00) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Oct 25 14:12

SPEC is set to: /spec16
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda1 ext4 394G 14G 380G 4% /

Additional information from dmidecode:
Warning: Use caution when you interpret this section. The 'dmidecode' program
reads system data which is "intended to allow hardware to be accurately
determined", but the intent may not be met, as there are frequent changes to
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Platform Notes (Continued)

hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Insyde Corp. 3.32 09/14/2016
Memory:
16x Micron 36ASF2G72PZ-2G1A2 16 GB 2 rank 2133 MHz
8x NO DIMM NO DIMM

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/spec16/libs/32:/spec16/libs/64:/spec16/sh"
OMP_NUM_THREADS = "16"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Base Compiler Invocation

C benchmarks:
  icc  -m64

C++ benchmarks:
  icpc  -m64

Fortran benchmarks:
  ifort  -m64

Benchmarks using both Fortran and C:
  icc  -m64 ifort  -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
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Base Portability Flags (Continued)

- 444.namd: -DSPEC_CPU_LP64
- 447.dealII: -DSPEC_CPU_LP64
- 450.soplex: -DSPEC_CPU_LP64
- 453.povray: -DSPEC_CPU_LP64
- 454.calculix: -DSPEC_CPU_LP64 -nofor_main
- 459.GemsFDTD: -DSPEC_CPU_LP64
- 465.tonto: -DSPEC_CPU_LP64
- 470.lbm: -DSPEC_CPU_LP64
- 481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
- 482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias

Peak Compiler Invocation

C benchmarks:
icc  -m64

C++ benchmarks:
icpc  -m64

Fortran benchmarks:
ifort  -m64

Benchmarks using both Fortran and C:
icc  -m64 ifort  -m64
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Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
- 433.milc: basepeak = yes
- 470.lbm: basepeak = yes
- 482.sphinx3: basepeak = yes

C++ benchmarks:
- 444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
  -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias
  -auto-ilp32
- 447.dealII: basepeak = yes
- 450.soplex: basepeak = yes
- 453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4
  -ansi-alias

Fortran benchmarks:
- 410.bwaves: basepeak = yes
- 416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
  -inline-level=0 -scalar-rep-
- 434.zeusmp: basepeak = yes
- 437.leslie3d: basepeak = yes
- 459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
  -inline-level=0 -opt-prefetch -parallel
- 465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
  -par-num-threads=1(pass 1) -prof-use(pass 2) -inline-calloc

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**CPU2006 license:** 3175  
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### Peak Optimization Flags (Continued)

465.tonto (continued):
- `opt-malloc-options=3`  
- `auto`  
- `unroll4`

Benchmarks using both Fortran and C:

- 435.gromacs: `basepeak = yes`
- 436.cactusADM: `basepeak = yes`
- 454.calculix: `-xCORE-AVX2`  
  - `ipo`  
  - `-O3`  
  - `-no-prec-div`  
  - `-auto-ilp32`  
  - `-ansi-alias`
- 481.wrf: `basepeak = yes`

The flags files that were used to format this result can be browsed at:

http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.html  
http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-BDW-V1.0.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml  
http://www.spec.org/cpu2006/flags/Huawei-Platform-Settings-BDW-V1.0.xml

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